# A new *Caecum* from the pacific coast of Panama, with illustration of the type specimen of *Caecum reversum* Carpenter, 1857 (Caenogastropoda: Rissooidea)

## Un nuevo *Caecum* de la costa pacífica de Panamá, con ilustración del ejemplar tipo de *Caecum reversum* Carpenter, 1857 (Caenogastropoda: Rissooidea)

Mauro PIZZINI*, Bret RAINES** and Italo NOFRONI***

*Recibido el 28-IV-2005. Aceptado el 19-III-2007*

ABSTRACT

The authors describe a new species, *Caecum skoglundae* from Panama Bay and they compare it to *Caecum reversum* Carpenter, 1857, stored in the NHML, providing SEM images of the holotype. The new species is also compared to *Caecum dextroversum* Carpenter, 1857 and *Caecum teres* Carpenter, 1857 from the Panamic Province, and to some of de Folin's original types, stored in MNHN, and here illustrated with photographs.

RESUMEN

Se describe una nueva especie, *Caecum skoglundae*, de la Bahía de Panamá y se compara con *Caecum reversum* Carpenter, 1857, depositado en el NHML, proporcionando imágenes al MEB del holotipo. La nueva especie también se compara con *Caecum dextroversum* Carpenter, 1857 y *Caecum teres* Carpenter, 1857 de la Provincia Panameña, así como con algunos tipos originales de de Folin, depositados en el MNHN, y ilustrados con fotografías.

KEY WORDS: Caenogastropoda, Rissooidea, Caecidae, taxonomy, new species, *Caecum skoglundae*, original type, *Caecum reversum*, Panama, Eastern Pacific.
PALABRAS CLAVE: Caenogastropoda, Rissooidea, Caecidae, taxonomía, nueva especie, *Caecum skoglundae*, *Caecum reversum*, Panamá, Pacífico Oriental.

## INTRODUCTION

The Family Caecidae is represented in the Panamic Province, an area included between 31° lat. N and 6° lat. S, by a remarkable number and variety of species. According to the first lists of geographical distribution made by KEEN (1971), SKOGLUND (1992), KOCH (1993) and SKOGLUND AND KOCH (1995), and considering the changes made by DRAPER (1979) and GEMMELL, HERTZ AND MYERS (1980), the final number of species in the Panamic Province amounts to 24.

We do not agree with the number of species quoted by SKOGLUND AND KOCH (1995), who did not consider at all the

* Largo della Caffarelletta, 6 - I - 00179 Rome (Italy) e-mail: pizzini.mauro@gmail.com
** 1121 North Street, Oswego, Kansas 67356 (USA) e-mail: rainesbk@yahoo.com
*** Via B. Croce, 97 - I - 00142 Rome (Italy) e-mail: italo.nofroni@uniroma1.it

generic and synonymical changes made by LIGHTFOOT (1993a,b). They also quoted *Caecum mirificum* (Folin, 1867), which does not exist as the typical form represented by the type specimen MNHN, but only as five specimens of the *minor* variety (KISCH, 1959).

Nevertheless we are convinced that, despite the seemingly exhaustive research efforts conducted over the last one hundred and fifty years, in particular by CARPENTER (1857, 1858), DE FOLIN (1867), BARTSCH (1920) and others, new species are still being discovered within this area, possibly some among de Folin's original types (26 species) stored in MNHN, which we have observed and photographed. Sometimes new discoveries are simply the result of misidentifications which go unnoticed or of uncertain species placements. Such is the situation with the new species described herein.

In this case, the problem was compounded because the species had been previously compared only to crude drawings of *Caecum reversum* Carpenter, 1857. Its original type had been glued to a tablet, making it difficult for researchers to draw accurate comparisons. For nearly one hundred and fifty years, samples of this species were stored in museums and collection shelves either as unknown species or misidentified. Today, with the use of Scanning Electron Microscopy (SEM) and the support of the Natural History Museum, London, we are able to clarify what *Caecum reversum* Carpenter, 1857 really is and compare it to the new species.

Abbreviations used:

LACM = Natural History Museum of Los Angeles County - (Los Angeles, U.S.A.)
MNHN = Museum National d'Histoire Naturelle - (Paris, France)
MPR = Mauro Pizzini colln. - (Rome, Italy)
MZB = Museo di Zoologia di Bologna - (Bologna, Italy)
NHML = Natural History Museum - (London, U.K.)
SBMNH = Santa Barbara Museum of Natural History - (Santa Barbara, U.S.A.)
es = empty shell (s), without soft parts and/or operculum
lc = live collected specimen (s), with soft parts and/or operculum
ph = type material examined through photos

## SYSTEMATICS

Superfamily RISSOOIDEA Gray J. E., 1847
Family CAECIDAE Gray J. E., 1850
Genus *Caecum* Fleming, 1813

***Caecum skoglundae*** sp. nov. (Figs. 1 A-F)

**Type material**: Holotype (LACM 3063) and 3 paratypes (A-C, LACM 3064), from type locality; 1 paratype (D, MZB 14140), 1 paratype (E, MNHN) and 1 paratype (F, NHML) all from Panama Bay, Balboa, Slip 18, Panama Canal. In commercially dredged sand from Panama Bay. Coll. C. Skoglund, April, 1981/Feb. 1985.

**Other material examined**: *Caecum skoglundae* new sp., only the type material. *Caecum complanatum* (Folin, 1867) holotype (ph), stored in MNHN. *Caecum dextroversum* Carpenter, 1857: 9 syntypes (ph), stored in NHML, n.1857.6.4.1548; among which a lectotype was selected by PIZZINI, NOFRONI AND OLIVERIO (1998). *Caecum imperfectum* (Folin, 1867) holotype (ph), stored in MNHN. *Caecum minutum* (Folin, 1867) holotype (ph), stored in MNHN. *Caecum parvulum* (Folin, 1867) holotype (ph), stored in MNHN. *Caecum reversum* Carpenter, 1857: holotype (ph), stored in NHML, n. 1857.6.4.1549. *Caecum venustum* (Folin, 1867) holotype (ph), stored in the MNHN. Also several specimens of *Caecum dextroversum* Carpenter, 1857 and *Caecum teres* Carpenter, 1857, stored in MPR.

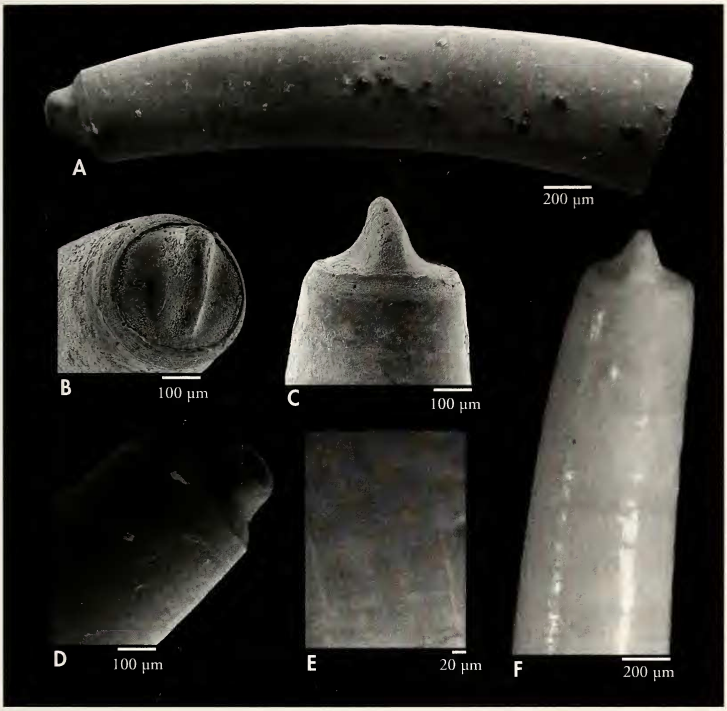


Figure 1. *Caecum skoglundae* sp. nov. A: Holotype - LACM 3063, gold coated, length 2,88 mm; B: septum, frontal view; C: microsculpture; D, E: detail of septum; F: ventral view. SEM imaging by D. Geiger.

*Figura 1.* Caecum skoglundae *n. esp. A: Holotipo - LACM 3063, metalizado en oro, longitud 2,88 mm; B: septum, vista frontal; C: microescultura; D, E: detalle del septo; F: vista ventral. Imágenes de MEB por D. Geiger.*

**Type locality**: Panama Bay, LACM 77-144. Punta Chame, Panama Prov., Panama. (8° 41′ N, 79° 39′ W). Coll. Don Shasky, June, 1977.

**Derivation of the name**: This species is in honour of Carol Skoglund, 1st Author's friend, who sent him some years ago the specimens here discussed and provided the bibliography and many elements useful for classification of the Caecidae of the Panamic Province.

*Description*: Shell of medium size for the Genus (dimensions of the holotype - length: 2.88 mm; width min: 0.45 mm; width max: 0.6 mm), less arched, smooth and glossy. The tube has a lesser diameter in its apical part, and has therefore a subcylindrical silhouette; the diameter gradually increases reaching its maximum near the aperture, then it tends to contract slowly, thus resulting in a simple, perfectly rounded aperture (Fig. 1 A). Microsculpture exclusively

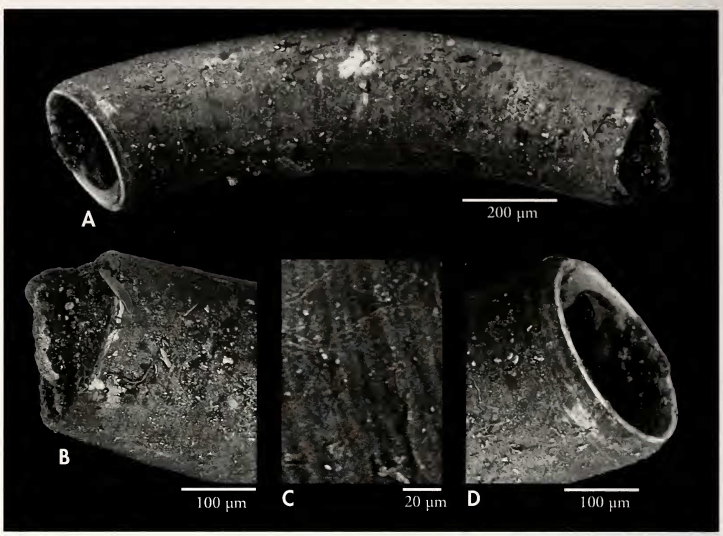


Figure 2. *Caecum reversum* Carpenter 1857. A: Holotype - NHML 1857.6.4.1549, uncoated, length 1.20 mm; B: detail of septum; C: microsculpture; D: detail of aperture. SEM imaging by K. Way.

*Figura 2.* Caecum reversum *Carpenter 1857. A: Holotipo - NHML 1857.6.4.1549, no metalizado, longitud 1,20 mm; B: detalle del septo; C: microescultura; D: detalle de la abertura. Imágenes de MEB por K. Way.*

consisting of a very fine growth striation, visible only with very strong optical enlargement (Fig. 1 C). Septum slightly inflated, less protruded over the cutting plane, without any visible trace of a temporary septum (Pizzini *et al.*, 1998). The mucro shows a particular shape, nearly lamelliform, unique in its kind, with a rounded top (Figs. 1 B, D, E, F). While handling the tube with its concave side towards the observer and the mucro at the top, it is oriented at an oblique angle toward the right side with a range from about 0° to 13° (Figs. 1 B, E). Colour evenly whitish. Periostracum thin and yellowish brown. Operculum and soft parts unknown.

*Discussion*: The new species fits very well the unnamed *"species # 3"* of Lightfoot (1993a, pp. 25-26, fig. 18) who wrote the following about its mucro's shape: *"Careful examination revealed no similarity to the mucro of* reversum*"*. To clear any doubts about Lightfoot's remark, we compare the new species and *Caecum reversum* Carpenter, 1857, providing for the first time SEM photos of the latter's type specimen. In our opinion, Lightfoot's statement is wholly correct, but she did not describe species # 3 as a new species. Carpenter's unclear description (Carpenter, 1857, p. 329) and the lack of an exhaustive iconography of reference - until now, limited only to the drawings of Brann (1966) - could have induced some malacologists to consider possible similarities between the two species here discussed.

As far as we know, the only mention of Carpenter's species was made by Keen (1968) who provided a vague drawing of the original type, and in a


Figure 3. A: *Caecum minutum* de Folin, 1867, holotype, "Iles aux Perles" (Islas Perlas, Panamá), 1.4 mm (MNHN); B: *Caecum parvulum* de Folin, 1867, holotype, same locality, 1.5 mm (MNHN); C: *Caecum imperfectum* de Folin, 1867, holotype, same locality, 1.8 mm (MNHN); D: *Caecum venustum* de Folin, 1867, holotype, same locality, 1.8 mm (MNHN); E: *Caecum complanatum* de Folin, 1867, holotype, same locality, 1.6 mm (MNHN); F: *Caecum dextroversum* Carpenter, 1857, Los Angeles Bay (USA), 1.95 mm (MPR); G, H: *Caecum teres* Carpenter, 1857, Estero Morua (Mexico), 2.15 mm (MPR); H: ventral view.

*Figura 3. A:* Caecum minutum *de Folin, 1867, holotipo, "Iles aux Perles" (Islas Perlas, Panamá), 1,4 mm (MNHN); B:* Caecum parvulum *de Folin, 1867, holotipo, misma localidad, 1,5 mm (MNHN); C:* Caecum imperfectum *de Folin, 1867, holotipo, misma localidad, 1,8 mm (MNHN); D:* Caecum venustum *de Folin, 1867, holotipo, misma localidad, 1,8 mm (MNHN); E:* Caecum complanatum *de Folin, 1867, holotipo, misma localidad, 1,6 mm (MNHN); F:* Caecum dextroversum *Carpenter, 1857, bahía de Los Angeles (USA), 1,95 mm (MPR); G, H:* Caecum teres *Carpenter, 1857, Estero Morua (México), 2,15 mm (MPR); H: vista ventral.*

later work (KEEN, 1971), simply quoted it in a check list. Given the peculiarity of the septum of *reversum* (possibly observed in the tables of BRANN, 1966), LIGHTFOOT (1993) after a brief description of *reversum*, translated almost literally from the original in Latin, wrote *"Nothing of this has been seen. Under the system put forth in this paper, this species would command a genus of its own"*, even though she did not see its original type. As for the opportunity to set up a new *genus*, as suggested by Lightfoot, we wish to point out that here we are using only the genus *Caecum "...as an imaginary container..."* (ABSALÃO AND PIZZINI, 2002), leaving out the *genera/subgenera*, based up to now on morphological characters which are totally haphazard and showing a clear superposition of these diagnostic characters at the supra-specific level.

The differences between *Caecum skoglundae* and *Caecum reversum* are

visible especially in the shape and direction of the mucro. In our species, it is lamelliform and oriented to the right side with a range of 0° to 13°, while in *reversum*, *"instead of having the apex turned to the back of the shell.....has the highest part towards the front"* (CARPENTER, 1857 - p. 329) with a curvilinear silhouette at its top (Figs. 2 A, B). The septum's shape in *Caecum skoglundae* is constant and we consider it to be a distinguishing characteristic of this species.

Furthermore, the tube of *Caecum skoglundae* is sub-cylindrical in the apical part and completely lacking any type of micro-sculpture (excluding a very fine axial growth striation), while in *Caecum reversum* it is clearly cylindrical along all its length, crossed by a growth striation which is more marked than in *skoglundae*, and a longitudinal vermiculate microsculpture (Figs. 2 C, D) completely absent in our species.

The singularity of the septum, the surface of the tube, completely smooth, and the contraction at the aperture of *Caecum skoglundae* make it a unique species among the Caecidae. Excluding *Caecum teres* Carpenter, 1857 and *Caecum dextroversum* Carpenter, 1857, which are smooth, all other species of the Panamic Province are provided with a sculpture which is more or less emphasized, ringed (e.g. *Caecum quadratum* Carpenter, 1857) or with longitudinal ribs (e.g. *Caecum insculptum* Carpenter, 1857).

*Caecum teres* (Figs. 3 G, H) is quite similar to *Caecum skoglundae* with white colour and a smooth surface of the tube, but has a differently shaped tube, which is less slender and crossed by a micro-sculpture of a very fine longitudinal striation, and more defined growth striation. In addition, *Caecum teres* shows a mucronate septum, quite rounded, with the point having a consistent tendency to be turned towards the dorsal side of the tube.

*Caecum dextroversum* (Fig. 3 F) has a cylindrical shape of the tube, and the temporary septum (the external one) is dome-shaped, while the inner one is mucronate with the point turned to the right side (PIZZINI *ET AL.*, 1998). There are five other smooth species among those described by de FOLIN (1867), whose type specimens are stored in MNHN: *Caecum complanatum* (Fig. 3 E) and *Caecum venustum* (Fig. 3 D) which belong to *Caecum farcimen* Carpenter, 1857, whereas *Caecum minutum* (Fig. 3 A), *Caecum imperfectum* (Fig. 3 C) and *Caecum parvulum* (Fig. 3 B) are probable synonyms respectively of *Caecum dextroversum*, *Caecum corrugatulum* and *C. glabriforme* (all Carpenter, 1857). *Caecum farcimen*, *Caecum corrugatulum* and *Caecum glabriforme* were well discussed and figured in LIGHTFOOT (1993b).

*Geographical distribution*: In addition to the type locality, the geographical distribution of *Caecum skoglundae* (= *Caecum sp.* # 3 of Lightfoot) includes Punta Paitilla (Panama), Panama Bay (Panama), Cuastecomate and off Barra de Navidad, (both Jalisco, Mexico), all in Skoglund colln. (LIGHTFOOT, 1993a) and Bahía de Panama, *fide* SKOGLUND AND KOCH (1995). Specimens in the LACM collection were dredged off Punta Chame (Panama) by the late Donald Shasky in 1977.

## ACKNOWLEDGEMENTS

We wish to thank Kathie Way, Amelia MacLellan and Andreia Salvador (all NHML staff) who provided us SEM photos of the original type of *Caecum reversum* Carpenter, 1857, Philippe Bouchet, Virginie Heros and Delphine Brabant (all MNHN staff) for sending us the digital photos of Folin's (1867) types, Daniel Geiger (SBMNH) who provided SEM photos for the new species *Caecum skoglundae*, Giar-Ann Kung (LACM) for her assistance with specimen preparation, Lindsay Groves (LACM), who assisted in locating additional examples within the museum's collection, and Carol Skoglund (U.S.A.) who sent the 1st author the specimens of the new species some years ago. We

also wish to thank Caterina Ciuferri and Marta Pizzini who helped with the translation into English of this article, and Silvia Regano for the translation into Spanish. The SEM facility at LACM is supported by the National Science Foundation under the MRI grant DBI-0216506.

## BIBLIOGRAPHY

ABSALÃO, R. S. AND PIZZINI, M., 2002. Critical analysis of subgeneric taxa of the Subfamily Caecinae (Caecidae: Caenogastropoda). *Archiv für Molluskenkunde*, 131 (1/2): 167-183.

BRANN, D. C., 1966. *Illustrations to "Catalogue of the collection of Mazatlan Shells" by Philip P. Carpenter*. Paleontological Research Institute, Ithaca, New York. Plates 32-37.

CARPENTER, P. P., 1857. *Catalogue of the collection of Mazatlan shells in the British Museum*. Reprint. Paleontological Research Institute Ithaca, N.Y.: 312-330.

CARPENTER, P. P., 1859. First steps towards a monograph of the Caecidae, a family of rostriferous Gastropoda. *Proceedings of the Zoological Society of London* [for 1858]: 413-444. London.

DRAPER, B. C., 1979. Radular development in the Family Caecidae. *Western Society of Malacologists Annual Report*, 11 (26-30)

FOLIN, L., 1867. Les méléagrinicoles. *Recueil des Publications de la Societé Havraise d'Etude diverse*, 33: 41-112, 6 pl.

GEMMELL, J., HERTZ, C. M. AND MYERS, B. W., 1980. Seastar predation on mollusks in the San Felipe Bay area, Baja California, Mexico. *The Festivus*, 12 (3): 24-55

KISCH, B. S., 1959. La collection de *Caecidae* du Marquis de Folin au Muséum National d'Histoire Naturelle. *Journal de Conchyliologie*, Paris, 99 (1) : 15-42

KEEN, A. M., 1968. West American mollusk types at the British Museum (Natural History). IV. Carpenter's Mazatlán collection. *Veliger*, 10 (4): 389-439, figs. 1-170, pl. 55 to 59.

KEEN, A. M., 1971. *Sea Shells of Tropical West America: Marine Mollusks from Baja California to Peru*. Stanford University Press, Stanford, California i-xiv + 1064 pp, ca. 4000 figs., 22 color pls.

KOCH, R., 1993. Geographic locations supplementing "Additions to the Panamic Province gastropod (Mollusca) literature – 1971 to 1992." By Carol Skoglund. *The Festivus*, 25 (7): 60-64

LIGHTFOOT, J., 1993a. Caecidae of the Panamic Province. Part One. *Of Sea and Shore*, 16 (1): 13-26, Port Gamble.

LIGHTFOOT, J., 1993b. Caecidae of the Panamic Province. Part Two. *Of Sea and Shore*, 16 (2): 75-87, Port Gamble.

PIZZINI, M., NOFRONI, I. AND OLIVERIO, M., 1998. Contribution to the knowledge of the Family Caecidae. 4. The temporary septum formation of some caecid species (Caenogastropoda: Rissooidea), *Iberus*, 16 (1): 133-140.

SKOGLUND, C., 1992. Additions to the Panamic Province gastropod (Mollusca) literature – 1971 to 1992. *Records of the Australian Museum*, Suppl. 4, 221 pp., 154 figs.

SKOGLUND, C. AND KOCH, R., 1995. New distributional information for Panamic province Rissooidea (Mollusca : Gastropoda). *The Festivus*, 27 (2): 23-28.z